Can You Imagine . . .

. . . stronger, more fatigue-resistant solder technology that will help electronics manufacturers make miniature cellular phones and remote controls.

NEW SOLDER TECHNOLOGY WILL ENABLE SMALLER ELECTRONICS

The demand for miniature electronic devices grows year by year, and with it comes the need for smaller printed circuit boards (PCBs). These tiny PCBs have less space for solder connections, which must maintain the highest level of reliability.

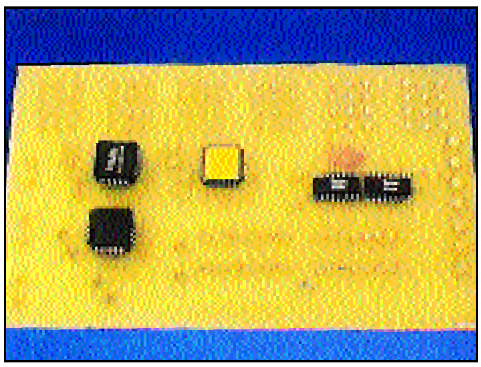
To avoid reliability problems, the BMDO SBIR program funded Toranaga Technologies, Inc. (Carlsbad, CA), to develop stronger, more fatigue-resistant solder technology for PCB manufacturing. Toranaga's proprietary combination of key metal alloys will make this grouping stronger than conventional lead-tin solders, allowing smaller, denser, and more rugged multilayer PCBs. BMDO needs more rugged PCBs for radar, missile interceptors, and other electronic equipment.

In addition, Toranaga's lead-free solder technology could alleviate growing environmental concerns over the disposal of lead-bearing PCBs, which can contaminate groundwater near landfills. Several European countries—including Germany, France, Sweden, and the United Kingdom—recently implemented mandatory recycling legislation for electronic components. These laws place the responsibility for proper disposal of lead-containing products squarely with the manufacturers. The adoption of similar waste disposal regulations in the United States would increase the domestic demand for lead-free solder technology.

TORANAGA EXPECTS TO OFFER LICENSES FOR ITS LEAD-FREE ATTACHMENT TECHNOLOGY.

Toranaga expects to license its solder to companies interested in creating lead-free attachment technology for their own electronic component assemblies. Its marketing department currently places the solder market at $350 million and growing 20 to 30 percent annually.

The company, formed to develop an organometallic conductive ink for creating wire traces on PCBs, entered into a licensing agreement with Kester Solder Company, a division of Litton Systems, to manufacture and market Ormet® ink. Kester provides royalty payments to Toranaga for transferring this technology to it.



■ This printed circuit board includes three types of components mounted with Toranaga's lead-free attachment technology.

ABOUT THE TECHNOLOGY

Investigating two solder products, Toranaga expects to meet the future demands of PCB assemblers using its atomized, lead-free alloy powders. The first product, a solder paste, will form stronger component joints than traditional lead-tin alloys. Because this formation will occur at a reflow temperature below 210°C, it represents a new solder option for PCB assembly. Most lead-free solder pastes require higher reflow temperatures, which can melt the plastic material of the PCB.

The second product combines a solder paste and a conductive adhesive. Designed to replace traditional solder pastes that lose mechanical bond strength because of accelerated aging, but similar to conventional solder, the hybrid will form strong intermetallic bonds with the contact pads. It will also form a metal matrix to stabilize electrical conduction within the joints, using a process called transient liquid-phase sintering. Finally, polymers in the hybrid will strengthen the joints. Toranaga expects the hybrid solder processing temperatures will be compatible with PCB manufacturing. Preliminary results from reliability testing show that the hybrid solder performs better than most commercially available conductive adhesives.